Life Cycle Costing and Port Structures

Bruce Lambert
Objectives

- What is Life Cycle Management
- How to incorporate into current plans
- Research challenges and sources for more information
What is Life Cycle Costing

- Avoiding unexpected system failure from negligent maintenance, budgeting or planning

- Generally starts at preconstruction of a project, but can be incorporated anytime
  - Do you build what you want or what you can you build?
  - How is this maintained?
Challenge in Life Cycle Management for Infrastructure

- Engineering Design Standards - structures gauged on risk of structural “failure” or condition
- Lack of consistent inspection approaches
- Engineering standards for different components – mechanical versus structural
- Difficult to test large structures
- Long Design life – 50 -100 years
- Harshness of marine environment
- Structure become technically obsolete before becoming physically obsolete
Risks from Poor LCM

- Port closures
- Risk to structural integrity
- Safety – injury or loss of life
- Environmental exposures
- Potential liability issues
A Generic System for Managing Port Structures

Goals

Asset Inventory

Condition Assessment (Inspection) and Performance Modeling

Budget

Alternatives Evaluation and Program Optimization (rehabilitation – removal)

Short and Long Range Plans

Project Implementation (Construction)

Performance Monitoring (Operations)
Implementing Life Cycle Costing During Planning/Construction

Determine required project needs and total costs over project cycle

Parameters to consider when costing alternatives:
- Net Present Value
- Determine useful life
- Loss of Revenue from failure
- Maintenance costs
- Demolition or removal costs
- Tax structures
Inspection During Operation

- Three approaches –
  - Fix as fail
  - Inspect and rehabilitate
  - Preventive maintenance

- Inspection types and frequency
  - Initial design suggests inspection schedule
  - Visual inspection not always accurate
  - Other inspection types
Implementation Challenges?

- Projects have multiple uses
- Determining or guaranteeing a minimum standards for safe use or performance
- Planning and defining current and future needs
- Process must be developed involving data integration – data warehousing
- Education to port staff, commissioners and port users necessary
- Unforeseen operational or legislative pressures
Research gaps related to adopting life cycle management

- Movement to more portable models and tools for end users
- Recognition this is a data intense process
- Examine ways to reliability model condition assessments
- Understand how system responds to extreme events
- Non-destructive inspection techniques
- Recommendations for given repair needs
- Properly quantifying uncertainties – risk management
More Sources of Information

- ASCE/AASHTO/FHWA/TRB
- PIANC – MarCom Technical Seminar, Feb 05
- USACE – Systems approach
One of 6 goals – LCM

Topics included design standards, costing structures, performance goals, and environmental considerations

Enclosed CD-Rom with appendix materials
PIANC – Other Items

- PIANC Congress – Estoril Portugal, May 14-18, 2006
- Ports 07 – Cosponsor with ASCE-COPRI March 25-28, 2007
Bruce Lambert
Senior Economist, Institute for Water Resources
Secretary, U.S. Section of PIANC
703-428-6667
Bruce.Lambert@usace.army.mil